ENCAPSULATED TRANSFORMER

TECHNICAL FIELD

THIS invention relates to transformers and other apparatus comprising transformers, such as power supplies.

BACKGROUND ART

It is known electrically to insulate a transformer by centralizing the transformer in an opaque plastic cap having a substantially rectilinear shape and an open bottom and to fill the region between the transformer and inside walls of the cap with an opaque insulating material. The material normally forms a concave bottom wall in a region between the transformer and a bottom of the cap. In use, heat is generated by the transformer and since neither the cap nor the intermediate insulating material transmits heat effectively, that heat is not dissipated effectively. This may cause damage to the transformer or may at least give rise to higher electrical losses. This problem is also encountered in other apparatus comprising transformers, such as power supplies.

Furthermore, the aforementioned transformer assembly is normally mounted on a printed circuit board by a plurality of legs extending from electrical terminals on the transformer to a region beyond the aforementioned bottom

of the cap. The cap is normally mounted on the board to abut against the board and as a consequence, a cavity is formed between the board and the aforementioned bottom wall. In use and as a result of variations in temperature in the cavity, air-entraining moisture moves into and is trapped in the cavity. Over a period of time, this moisture causes damage to the printed circuit board.

OBJECTIVE OF THE INVENTION

Accordingly, it is an object of the present invention to provide apparatus and a method of producing same with which the applicant believes the aforementioned disadvantages may at least be alleviated.

SUMMARY OF THE INVENTION

According to the invention there is provided an electric assembly comprising a transformer and a translucent electricity insulating cover therefor.

The cover is preferably transparent. The transformer may also comprise a transparent bobbin on which a core for the transformer and transformer windings are provided.

In one embodiment the cover may be in the form of a skin.

The skin may comprise a transparent outer shell of a rigid material and a layer of a transparent filling material provided between the shell and the transformer. The shell may comprise first and second body halves fitted together to form the shell.

The skin may comprise outwardly extending protrusions, to provide a clearance between the skin and a surface on which the assembly is mounted in use.

In another embodiment, the cover may be in the form of a box and may comprise a plurality of pins for mating with and making electrical contract with a conventional socket arrangement.

The transformer may form part of power supply circuitry and the power supply circuitry may comprise a first output which is accessible through the cover. The power supply circuitry may further comprise a second output which is in parallel with the first output and which is also accessible through the cover.

The circuitry may comprise a fuse, and the fuse is preferably provided in a recess in the cover.

The cover may comprise a lid for opening and closing the recess.

Also included within the scope of the invention is a method of forming an electric assembly, the method comprising the steps of:

- providing a transformer; and
- permanently enclosing the transformer in a translucent electricity insulating cover.

The transformer may be enclosed by locating the transformer in a rigid transparent shell.

The transformer may be located by providing a rigid transparent shell having a shape substantially the same as a general shape of the transformer; mounting the transformer in the shell so that a small clearance is defined between substantially a whole of an outer surface of the transformer and the shell; and filling the clearance with a transparent electricity insulating material.

BRIEF DESCRIPTION OF THE ACCOMPANYING DIAGRAMS

The Invention will now further be described, by way of example only, with reference to the accompanying diagrams wherein:

figure 1 is a diagrammatic perspective view of a prior art transformer assembly;

figure 2 is a diagrammatic exploded perspective view of a transformer assembly according to the invention;

figure 3 is a diagrammatic perspective view of the assembly in figure 2, in assembled form;

figure 4 is a diagrammatic perspective view from above of a power supply assembly according to the invention;

figure 5 is a diagrammatic perspective view form below of the power supply assembly; and

figure 6 is a basic block diagram of the power supply in figure 4.

DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

A prior art transformer assembly is generally designated by the reference numeral 10 in figure 1. The assembly comprises a transformer (not shown) mounted in an opaque cap 12 defining an open bottom 14. A body of an opaque thermosetting epoxy resin 16 is provided in the cap to embed the

transformer, thereby to insulate it electrically and to mount it permanently in the cap.

Four conductive legs 18 connected to terminals (not shown) of the transformer extend beyond a concave bottom wall 17 formed by the resin and also beyond the open bottom 14 of the cap and are used to connect the transformer to external circuitry (also not shown).

The disadvantages of this assembly are referred to in the introduction of this specification.

A transformer assembly according to the invention is generally designated by the reference numeral 20 in figure 2. The assembly comprises a transformer 30 comprising a transparent bobbin 22 made of a suitable plastics material. A stack 23 of magnetic material laminates extend through and around the bobbin, to form the magnetic core of the transformer. The primary winding 24 and the secondary winding 26 of the transformer are provided on the bobbin in known manner. However, no insulating tape is provided about the windings, as is the case in some known transformers, and transformer assemblies. Conductive legs 28 are connected to input and output terminals (not shown) of the transformer 30.

The assembly further comprises first and second body halves 32, 34 of a translucent, preferably transparent permanent shell 31 (shown in figure 3) of a suitable rigid plastics material. The two body halves collectively form the shell having a shape and configuration substantially similar to the general external shape of the transformer 30. When assembled, there is defined a small clearance between the shell 31 and the transformer 30 enclosed thereby. Second body half 34 defines an opening 36 in a center region thereof.

When making the assembly and after the shell 31 has been formed by clipping body halves 32 and 34 together, a transparent thermosetting material is introduced into the shell via opening 36 to fill the clearance, to form a thin layer between the transformer and shell and to displace air inside the shell. The material may be introduced by means of a suction mechanism and process. The material is then allowed to cure.

The assembly thus comprises a thin transparent skin 38 (shown in figure 3) for the transformer constituted by the transparent layer 37 and the transparent shell 31.

On body half 34, a plurality of externally extending protrusions or feet 33 are provided. When the assembly is mounted on a surface (not shown) the feet ensures that there is a permanent clearance (also not shown) between the shell 31 and the surface. This clearance improves heat exchange between the assembly and the environment.

The legs 28 extend beyond the body half 34, so that the assembly 20 may be mounted on printed circuit boards (not shown) in well known manner. The feet 33 ensures that a permanent clearance is provided between the assembly and the printed circuit board, to facilitate circulation of air between the transformer and the board and which improves the dissipation of heat generated by the transformer.

It is believed that with the transparent bobbin 22, no insulation type about the windings (24, 26) and the thin transparent skin 38, heat generated by the transformer is transmitted outwardly more effectively than is the case with the aforementioned prior art transformers.

The assembly may define holes 40 in ear regions 42, 44, of the bobbin 22 and body half 34 respectively. These holes, which are easily accessible from a region in line with the centre axes of the holes, could be used to

mount the transponder on a chassis 46 by means of screws 48 or bolts and nuts, for example.

Accordingly, the compact assembly according to the invention is suitable for both so-called printed circuit board and chassis mount.

In figures 4 and 5, there is shown a power supply assembly 50 according to the invention. The power supply assembly 50 comprises a transparent or translucent cover in the form of a box 52 for power supply circuitry 54, comprising a transformer 56. The cover 52 facilitates the transmission of heat generated by the circuitry.

The cover comprises a plurality of pins 58 (two or three) for cooperating with a conventional socket arrangement (not shown) of a mains power supply network. In a base 52.1 of the cover, there is provided a cavity 60 for a replaceable fuse 62 connected in either a primary or secondary circuit of the transformer. The cavity is openable and closeable by a removable lid 64.

The cover defines a first opening providing access to a first pair of DC output terminals 66 from the power supply. A second pair of output

terminals 68 connected in parallel with the first pair is also accessible through the cover.

A block diagram of the power supply is shown in figure 6. The aforementioned pins are designated 58 and are connected to protective circuitry 70 comprising lightning protection circuitry and the primary winding 72 of the transformer. A secondary winding 74 of the transformer is connected to a voltage regulating circuit 76 and the regulating circuit is connected to the output terminals 66 and 68. The fuse 62 may be connected in the primary and/or the secondary circuit of the transformer.

It will be appreciated that there are many variations in detail on the apparatus and method according to the invention without departing from the scope and spirit of the appended claims.